I/We Claim:

- 1. A method for enhancing speech intelligibility of a speech signal, comprising the steps of:
- (a) performing syllable segmentation on a frame of the speech signal in order to detect a syllable;
- (b) dynamically determining a scaling factor for a segment of speech in response to step (a), wherein the segment is contained in the frame;
- (c) applying the scaling factor to the segment in order to modify a time scaling to the segment; and
- (d) blending the segment with an overlapping segment in order to essentially retain a frequency attribute of the speech signal that is processed.
- 2. The method of claim 1, wherein the syllable is a time-scale modification syllable (TSMS) comprising a consonant –vowel transition and a steady-state vowel.
 - 3. The method of claim 2, wherein step (b) comprises the steps of:

setting the scaling factor to a first value, wherein time expansion occurs during an approximate first one third of the TSMS; and

setting the scaling factor to a second value, wherein time compression occurs during an approximate next two thirds of the TSMS.

4. The method of claim 2, wherein step (b) comprises the steps of:

setting the scaling factor to a first value, wherein time expansion occurs during the consonant-vowel transition; and

setting the scaling factor to a second value, wherein time compression occurs during a steady-state vowel.

5. The method of claim 4, where step (b) further comprises:

setting the scaling factor to a third value, wherein time compression occurs during low energy regions of the speech signal.

- 6. The method of claim 5, wherein a time duration of the speech signal is essentially equal to a time duration of the processed speech signal.
 - 7. The method of claim 1, further comprising the step of:
- (e) modifying frequency domain characteristics of the speech signal in order that a transformed speech signal is characterized by enhanced acoustic cues.
- 8. The method of claim 7, wherein step (e) comprises: adaptive spectral enhancing the speech signal, wherein a distinctness of spectral peaks of the speech signal is increased.
- 9. The method of claim 8, wherein step (e) further comprises:
 emphasizing higher frequencies of the speech signal, wherein an upward spread of
 masking of the speech signal is reduced.
- 10. The method of claim 1, wherein step (d) utilizes an algorithmic technique selected from the group consisting of an overlap-add (OLA) technique and a waveform similarity overlap-add (WSOLA) technique.
 - 11. The method of claim 1, wherein step (d) comprises the steps of:

adding the overlapping segment with the segment if a correlation between the two segments is greater than a threshold; and

essentially retaining the segment if the correlation between the two segments is less than the threshold.

- 12. The method of claim 2, wherein step (a) comprises: detecting a high energy region of the speech signal.
- 13. The method of claim 2, wherein step (a) comprises: detecting abrupt changes in frequency-domain characteristics of the speech signal.

- 14. The method of claim 2, wherein step (a) comprises: utilizing cross-correlation measures.
- 15. The method of claim 2, further comprising the step of: amplifying a first portion of the TSMS in order to partially restore an associated energy in response to step (c).
 - 16. The method of claim 1, further comprising the steps of:
 - (e) determining a time delay associated with the segment; and
- (f) adjusting the scaling factor of a subsequent segment if the time delay is greater than a threshold in response to step (c).
- 17. The method of claim 1, wherein the frequency attribute is a short-term Fourier Transform (STFT) of the speech signal.
 - 18. The method of claim 1, further comprising the step of:
- (e) outputting a processed speech signal to a telecommunications network in response to step (d).
 - 19. The method of claim 1, further comprising the steps of:
 - (e) estimating a pitch component of the speech signal;
- (f) utilizing information about the pitch component in step (d) in response to step (e); and
 - (g) outputting a processed signal to a speech coder in response to step (f).
- 20. The method of claim 19, wherein the speech coder is selected from the group consisting of a code excited linear predication (CELP) coder, a vector sum excitation prediction (VSELP) coder, a waveform interpolation (WI) coder, a multiband excitation (MBE) coder, an improved multiband excitation (IMBE) coder, a mixed excitation linear prediction (MELP) coder, a linear prediction coding (LPC) coder, a pulse code modulation (PCM) coder, a differential pulse code modulation (DPCM) coder, and an adaptive differential pulse code modulation (ADPCM) coder.

- 21. The method of claim 1, further comprising the step of:
- (e) outputting a processed speech signal to a speech coder in response to step (d).
- 22. A method for enhancing an intelligibility of a speech signal comprising the steps of:
- (a) adaptive spectral enhancing the speech signal, wherein a distinctness of spectral peaks of the speech signal is increased;
- (b) emphasizing higher frequencies of the speech signal, wherein an upward spread of masking of the speech signal is reduced;
 - (c) extracting a frame from the speech signal;
- (d) calculating an energy contour and a spectral feature transition rate (SFTR) contour corresponding to the frame;
- (e) performing syllable segmentation utilizing the energy contour and the SFTR contour in order to detect a time-scale modification syllable (TSMS);
- (f) applying a scaling factor to a segment of speech, wherein the segment corresponds to a portion of the frame, comprising:
 - (i) setting the scaling factor to a first value if a consonant-vowel transition is detected within the TSMS;
 - (ii) setting the scaling factor to a second value if a steady-state vowel is detected with the TSMS; and
 - (iii) setting the scaling value to a third value for other portions of the speech signal;
- (g) determining an overlapping segment that is best-matched to the segment according to a cross-correlation and waveform similarity criterion;
 - (h) calculating a time delay associated with the segment;
- (i) adjusting the scaling factor associated with a subsequent segment according to the time delay determined in step (h);
 - (j) overlapping and adding the segment and the overlapping segment; and
- (k) outputting a modified frame in response to processing all constituent segments of the frame.

- 23. A method for enhancing an intelligibility of a speech signal comprising the steps of:
 - (a) extracting a frame from the speech signal;
- (b) calculating an energy contour and a spectral feature transition rate (SFTR) contour corresponding to the frame;
- (c) performing syllable segmentation utilizing the energy contour and the SFTR contour in order to detect a time-scale modification syllable (TSMS);
- (d) applying a scaling factor to a segment of speech, wherein the segment corresponds to a portion of the frame, comprising:
 - (i) setting the scaling factor to a first value if a consonant-vowel transition is detected within the TSMS;
 - (ii) setting the scaling factor to a second value if a steady-state vowel is detected with the TSMS; and
 - (iii) setting the scaling value to a third value for other portions of the speech signal;
- (e) determining an overlapping segment that is best-matched to the segment according to a cross-correlation and waveform similarity criterion;
 - (f) calculating a time delay associated with the segment;
- (g) adjusting the scaling factor associated with a subsequent segment according to the time delay determined in step (h);
 - (h) overlapping and adding the segment and the overlapping segment; and
- (i) outputting a modified frame in response to processing all constituent segments of the frame.

- 24. A method for enhancing an intelligibility of a speech signal that is processed by a speech coder, comprising the steps of:
 - (a) extracting a frame from the speech signal;
- (b) performing syllable segmentation in order to detect a time-scale modification syllable (TSMS);
- (c) applying a scaling factor to a segment, wherein the frame comprises at least one segment, comprising:
 - (i) setting the scaling factor to a first value if a consonant-vowel transition within the TSMS is detected;
 - (ii) setting the scaling factor to a second value if a steady-state vowel within the TSMS is detected; and
 - (iii) setting the scaling factor to a third value for other portions of the frame;
 - (d) estimating the pitch component of the frame;
- (e) determining an overlapping segment that is best-matched to the segment according to a cross correlation and waveform similarity criterion, and to the speech component if the frame has a voiced characteristic;
 - (f) combining the segment with an adjacent segment, comprising:
 - (i) overlapping and adding the segment and the overlapping segment if a correlation between the segment and the overlapping segment is greater than a threshold; and
 - (ii) essentially retaining the segment if the correlation between the segment and the overlapping segment is less than the threshold; and
- (g) outputting a modified frame to the speech coder in response to processing all constituent segments of the frame.